

claims 12 - 23 stand withdrawn as being directed to a non-elected invention.

In the office action mailed February 25, 2003, claims 4 and 11 were rejected under 35 U.S.C. 112, first paragraph. Additionally, claims 1 - 11 and 24 - 26 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,366,695 to Erickson in view of U.S. Patent No. 4,302,256 to Kenton.

The foregoing rejections are traversed by the present response.

The present invention relates to a nickel base superalloy having a microstructure which is pore-free and eutectic $\gamma - \gamma'$ free. The nickel base superalloy, in a preferred embodiment, has a composition comprising 3.0 to 12 wt% chromium, up to 2.0 wt% molybdenum, 3.0 to 10 wt% tungsten, up to 5.0 wt% rhenium, 6.0 to 12 wt% tantalum, 4.0 to 7.0 wt% aluminum, up to 15 wt% cobalt, up to 0.05 wt% carbon, up to 0.02 wt% boron, up to 0.1 wt% zirconium, up to 0.8 wt% hafnium, up to 2.0 wt% niobium, up to 1.0 wt% vanadium, up to 0.7 wt% titanium, up to 10 wt% of at least one element selected from the group consisting of ruthenium, rhodium, palladium, osmium, iridium, platinum, and mixtures thereof, and the balance essentially nickel. The microstructure of the nickel base superalloy preferably

has a gamma prime morphology which includes a bimodal γ' distribution.

The nickel base superalloys of the present invention have particular utility in the manufacture of components to be used in a hydrogen environment such as turbine blades and vanes in liquid hydrogen fueled rocket propulsion systems.

With regard to the rejection under 35 U.S.C. 112, first paragraph, the rejection is erroneously made. The fact that the Examiner does not understand the term "octet shaped" is not a basis for a rejection under 35 U.S.C. 112, first paragraph. Similarly, the fact that the Examiner can not find any reference to "octet shaped" particles in the literature is of no consequence. The specification in the instant application tells one how to make a single crystal nickel-based superalloy having the claimed microstructure including large γ' particles have an octet shape. See page 4, line 11 to page 6, line 20 of the specification. 35 U.S.C. 112, first paragraph requires nothing more than telling one of ordinary skill in the art how to make and use the invention. Applicants have clearly told everyone how to make and use the claimed nickel base superalloy and thus have complied with the requirement of 35 USC 112, first paragraph. The fact that the Examiner cannot find

anything in the prior art about nickel base superalloys having the claimed microstructure speaks to the patentability of the present invention.

Without waiving the foregoing argument, to facilitate the Examiner's understanding, attached hereto is a photomicrograph showing octet shaped particles.

With respect to the obviousness rejection, it is submitted that neither reference teaches one of ordinary skill in the art, nor suggests to one of ordinary skill in the art, how to make a nickel base superalloy having the claimed composition and the claimed microstructure. In particular, neither of the references teaches or suggests how to make an alloy which is eutectic $\gamma - \gamma'$ free. With respect to the Examiner's reliance on the processing in Table IV in Erickson, the Examiner misinterprets the meaning of the table. The processing performed by Erickson is intended to get rid of the γ' particles for the purpose of improved creep resistance. Erickson does not get rid of all γ' eutectic. In fact, there is nothing in Erickson which suggests this takes place. The fact that the alloy may be fully solutionized does not mean that it is eutectic $\gamma - \gamma'$ free. In the context of the present invention, it is very important that the alloy be eutectic free to

eliminate the initiation of fatigue cracks in a hydrogen environment.

If one examines Erickson, one does not find the processing steps employed by Applicants to create the claimed alloy. Thus, it can not be said that Erickson creates an alloy that is eutectic $\gamma - \gamma'$ free.

With regard to Kenton, it is submitted that the only reason it has been cited is because Applicants claim an alloy which is pore-free in addition to eutectic $\gamma - \gamma'$ free. Erickson has no interest in creating a pore-free alloy. Kenton relates to a HIP process, it does not teach or suggest the desirability of a nickel based superalloy which has both of the aforementioned physical properties. Thus, it does not cure the deficiency of Erickson. Since neither Erickson nor Kenton recognizes the advantages of an alloy which has both of these properties, claims 1 - 11 and 24 - 26 are allowable. The obviousness rejection is nothing more than an improper hindsight rejection which is nothing more than two pieces of prior art combined solely to meet the limitations of the claims.

With regard to claims 2, 3, 5 - 9, 11, and 24 - 26, each of these claims is allowable on its own accord as well as for the same reasons that its parent claim(s) are allowable. The references, taken individually or

collectively, do not teach or suggest the claimed combination of features. For example, there is nothing in either of the cited references which would teach one of ordinary skill in the art how to make an octet shaped particle, which is not an easy thing to do. There is also nothing in the cited references which would teach one of ordinary skill in the art how to make an alloy with the claimed bimodal structure and the claimed particle sizes. If the Examiner wishes to rely on the argument that it is within the expected skill in the prior art to obtain the desired particle sizes, then he should cite a reference to establish same. Failing the citation of such a reference, the claims to the particle sizes should be allowed. The same is true for the subject matter claimed in claims 8 and 9.

It should be recognized that Applicants have developed an alloy with a microstructure that can not be found in the prior art. That is because no one in the prior art has thought about developing such an alloy. Obtaining the claimed alloy is not just a matter of composition, it requires specialized processing, which is neither taught nor suggested in the prior art. Applicants have truly developed a novel and non-obvious alloy which is set forth in claims 1 - 11 and 24 - 26.

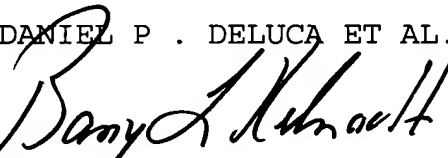
For the above reasons, the instant application is believed to be in condition for allowance.

Should the Examiner believe an additional amendment is needed to place the case in condition for allowance, he is invited to contact Applicant's attorney at the telephone number listed below.

No fee is believed to be due as a result of this response. Should the Director believe that a fee is due, he is hereby authorized to charge said fee to Deposit Account No. 21 - 0279.

Respectfully submitted,

DANIEL P . DELUCA ET AL.

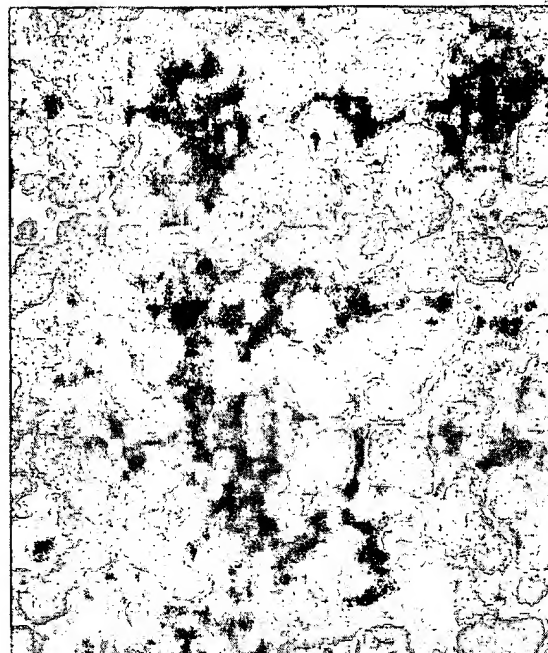
By 
Barry L. Kelmacher
Attorney for Applicants

Telephone: (203) 777-6628 ext. 112
Telefax : (203) 865-0297

Date: May 27, 2003

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on May 27, 2003


Nicole Motzer



The conventional SC alloy microstructure, $\sim 0.5 \mu$ cuboidal γ' in a γ matrix (left) compared to the Bimodal γ' structure. The 4 lobed γ' octets are approximately 10μ accross